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**PROJECT SPECIFIC PLAN
FOR THE CERTIFICATION OF
AREA 1 PHASE II UTILITY TRENCHES**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO**



SEPTEMBER 1999

**U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE**

**20710-PSP-0008
REVISION 0**

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OF AREA 1 PHASE II UTILITY TRENCHES**

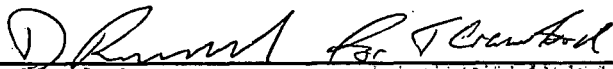
REVISION 0

SEPTEMBER 1999


Prepared For:

**U.S. Department of Energy
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9/2/99
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LIST OF ACRONYMS AND ABBREVIATIONS

A1PII	Area 1, Phase I
A1PII	Area 1, Phase II
A1PII-S3UT	Area 1, Phase II Sector 3 Utility Trenches
ASCOC	area-specific constituent of concern
ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
CU	certification unit
FAL	Field Activity Log
FDF	Fluor Daniel Fernald
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GIS	graphical information system
HPGe	High Purity Germanium Detector
IRDP	Integrated Remedial Design Package
ppm	parts per million
PSP	Project Specific Plan
PWID	Project Waste Identification Document
QA/QC	Quality Assurance/Quality Control
SEP	Sitewide Excavation Plan
SMMP	Soil and Miscellaneous Media Project
V/FCN	Variance/Field Change Notice
WAO	Waste Acceptance Organization
WDSS	Waste Disposition Support Services

1.0 INTRODUCTION**1.1 PURPOSE**

This Project Specific Plan (PSP) describes the sampling and analysis activities necessary to certify the Area 1, Phase II Sector 3 Utility Trenches (A1PII-S3UT) located in A1PII adjacent to the Sewage Treatment Plant (STP) area.

1.2 SCOPE

The scope of this PSP is limited to real time scanning for precertification and the collection of the certification samples for A1PII-S3UT. This work will be performed in accordance to the Data Quality Objective SL-043, *Certification*, and SL-049, *Real Time Pre-certification Scanning*. An uncontrolled copy of these DQOs is included in Appendix A.

1.3 KEY PROJECT PERSONNEL

The key project personnel include:

**TABLE 1-1
KEY PROJECT PERSONNEL**

Title	Name	Alternate
DOE Contact	Rob Janke	Allen Harris
A1PII Project Manager	Tom Crawford	Dave Russell
A1PII Characterization Lead	Alex Duarte	Jenny Vance
Field Sampling Manager	Mike Frank	Tom Buhrlage
Data Management Lead	Jenny Vance	Alex Duarte
Real Time Manager	Joan White	Dale Sieller
Real Time Contact	Dave Allen	Roger Knight
Laboratory Contact	Audrey Hannum	Grace Ruesink
Waste Disposition Contact	Christa Walls	Linda Barlow
Health & Safety	Debbie Grant	Gregg Johnson
Quality Assurance Contact	Reinhard Friske	Frank Thompson

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2.0 CERTIFICATION DESIGN, SAMPLING, AND ANALYSIS

2.1 CERTIFICATION DESIGN

The certification design follows the general approach outlined in Section 3.4 of the SEP (DOE, 1998). As shown in Figure 1, the areas to be certified consist of five Certification Units (CUs) within four utility trench excavations as follows:

- CU A1PII-S3UT-01 - This CU consists of the northern most trench, labeled Trench 1 on Figure 1, contains a 4 inch drinking water pipe
- CU A1PII-S3UT-02 - This CU is in Trench 2, and contains the an 8 inch sanitary sewer pipe.
- CU A1PII-S3UT-03 - This CU is in Trench 2 which contains a 3 inch drinking water pipe, a 12 inch waste water effluent pipe, and a 4 inch fuel gas line.
- CU A1PII-S3UT-04 - This CU is in Trench 3 contains an electrical conduit.
- CU A1PII-S3UT-05 - This CU is in Trench 4 contains a 16 inch storm sewer and a 4 inch fuel gas line.

Figure 1 shows the CU design for all the CUs under the scope of this PSP.

2.2 SAMPLING LOCATIONS

As discussed in the PSP for Certification Sampling of Area 1, Phase II Sector 3 Utility Trench Sampling, sampling will occur during the excavation of the trenches and the removal of the utilities. Section 4 of the A1PII Supplemental Characterization Package discusses the process for the removal of the utilities and the disposition of the material excavated. Once the pipe and bedding material has been removed, the trench will be overexcavated at the designated sample locations, and soil will be placed adjacent to the trench. The soil material will then be scanned using real-time instrumentation, specifically using High Purity Germanium (HPGe) detectors. If the real-time equipment shows below FRL conditions the certification sample will be taken from the temporarily stockpiled soil. The trench will then be backfilled for safety purposes. The sample locations are provided in Appendix B.

Sample identifiers for each sample are listed in Appendix B and Fernald Analytical Computerized Tracking System (FACTS) identification numbers will be assigned to each sample. Note that the HPGe measurements are included in the numbering system, and are listed in Appendix B. The unique sample identification system is as follows:

A1PII - Sector Certification Area Certification Unit - Sample Location Suite QC, where:

A1PII = Area 1, Phase II

Certification Area = *S3UT* Sector 3 Utility Trenches

Certification Unit = 01 through 05

Sample Location = location number within the CU 1 through 16

Suite = Analytical Suite. "R" = radionuclides, "M" = Metals, G = HPGe

QC = Quality control sample. A "D" indicates a duplicate sample, where applicable. "X" (e.g., A1PIII-X-R) will be used to indicate a rinsate or container blank sample, as assigned by EM personnel.

2.3 SURVEYING

The NAD83 State Planar coordinates have been determined for each sample location, as shown in Appendix B. CU sample locations shown in Figure 1 will be marked in the field using the Geodimeter survey instrumentation following procedure EQT-05, *Geodimeter7 4000 Survey System - Operation, Maintenance, and Calibration*. Since the sample locations are within the trench area, a location which is offset from the trenches will also be surveyed and marked to ensure that the sample collection is within the 2 feet of the actual location. Any exception or change in location must be approved by the Characterization Lead and documented in a Variance Request/Field Change Notice Form (VR/FCN).

2.4 REAL TIME MONITORING

Once the utility pipe and bedding material has been removed, the contractor will overexcavate at the designated sample location, and place the soil in an area adjacent to the trench for a precertification scan using the HPGe. Since the trenches will be back-filled prior to receipt of the certification results (to avoid having an open excavation), the intent of this precertification is to minimize the risk of back-filling the trench with soil above FRL. The precertification monitoring will be consistent with the DQO SL-049 *Real Time Pre-certification Scanning*, as applicable, and the User's Manual Sections 2.0, 3.0, and 5.0 of the User's Manual.

One moisture measurement will be collected for each HPGe measurement. One consecutive duplicate HPGe measurement will be collected for each CU (the duplicate will be collected immediately after the initial measurement at the same acquisition time and detector height) as identified in Appendix A. HPGe measurements will be accompanied by GPS northing and easting coordinates.

HPGe precertification scans will be conducted at a 1 foot detector height with a 15 minute count time. The approximate field of view will be 15 feet diameter from the measurement location. If the piles are smaller than 15 feet a 1 foot detector height may be used with a field of view of 6 feet. The radon monitor, with same detector height and count time will be positioned in the proximity of the HPGe measurements to ensure the radon correction can be applied to the radium-226 data. If HPGe measurements show above FRL conditions the contractor will remove the soil and further excavate the trench until below FRL conditions are met.

2.5 PHYSICAL SAMPLING

All cores will be collected using a 2" to 3" diameter plastic or stainless steel liners, as identified in SMPL-01, *Solids Sampling*, and will be sealed using plastic end caps to create a sample container. At the discretion of the Sampling Field Manager, samples may be collected using other methods as specified in SMPL-01. Sample collection must be from the surface area of the material stockpile to a depth of 0 to 3 inches. A separate core will be collected for the chemical analytes (2" diameter core) and the radiological analytes (3" diameter core). The samples will be batched in the field by CU. All samples from a CU which will be submitted for analysis together, including Quality Control samples, will be submitted to the Sample Processing Laboratory (SPL) on one Chain-of-Custody form, which will represent one release.

To meet the quality control requirements, twice the sample volume will be collected at the following locations. The soil will then be homogenized, then split into duplicate samples according to SMPL-21, Section 6.5. All samples, including duplicates, will be assigned a unique sample identification number as identified in Appendix B.

2.6 TARGET ANALYTE LISTS (TALs) AND ANALYTICAL METHODOLOGY

Area Specific Contaminants of Concern (ASCOCs) were developed for each group of CUs within scope of this PSP. Target Analyte Lists (TALs) based on the ASCOCs are listed in Tables 2-1 through 2-2 and in Appendix B.

For samples being submitted for radiological analyses:

TABLE 2-1
TAL A - RADIOLOGICAL
Total Uranium
Radium-226
Radium-228
Thorium-228
Thorium-232
Technetium-99

For samples being submitted for metal analyses:

TABLE 2-2
TAL B - METALS
Beryllium

Laboratory analysis of certification samples will be conducted using approved laboratory methodology. The following tables summarize the sampling and analytical requirements.

TABLE 2-3
SAMPLING REQUIREMENTS

Target Analyte List	Sample Matrix	Holding Time/ Preservative	Container
TAL A Radiological	Solid	6 months No preservative	3" diameter liner or 500 ml Glass or Plastic
TAL B Metals	Solid	6 months Cool 4 °C	3" diameter liner or 250 ml Glass or Plastic

Further analytical requirements are stated in the statements of work to the laboratories. Note that all

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isotopic thorium analyses will be done using the gamma spectroscopy.

All samples will be submitted for ASL D analysis as described in the SCQ, and will be reported with ASL D data packages. The radiological constituents will be analyzed with ASL E detection limits, which will be set at 1/10 of the FRL.

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS**3.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA
VALIDATION**

The Field Quality Control, Analytical and Data Validation requirements are as follows:

- Field Quality Control requirements include one duplicate in each CU, as noted in Appendix B.
- All analyses will be performed at ASL D.
- An ASL D package will be provided for each sample. All the data will be validated to Level C and the data from CU A1PII-S3UT-03 will be validated to Level D.

Once all data are validated, results will be entered into the Sitewide Environmental Database and a statistical analysis will be performed to evaluate the pass/fail criteria for the each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP (DOE 1997a). This work is being performed per the requirements as stated in DQO SL-043 (Appendix A).

3.2 PROCEDURES AND MANUALS

To ensure consistency and data integrity, field activities in support of the PSP will follow the requirements and responsibilities outlined in the procedures and guidance documents referenced below.

ADM-02, Field Project Prerequisites

ADM-17, *In-Situ* Gamma Spectroscopy Data Management

ADM-19, *In-Situ* Gamma Spectrometry Field Prerequisites

EQT-23, High Purity Germanium Detectors

EQT-32, Troxler 3400 Series Moisture Density Gauge

EQT-39, Zelex Infrared Moisture Meter

EQT-22, High Purity Germanium Detector *In-Situ* Efficiency Calibration

SMPL-01, Solids Sampling

SMPL-21, Collection of Field Quality Control Samples

SDP 766-S-1000, Shipping Samples to Offsite Laboratories

EQT-33, Real Time Differential Global Positioning System Operation

User's Manual, Users Guidelines, Measurement Strategies, and Operational Factors for
Deployment of *In-Situ* Gamma Spectroscopy at the Fernald Site

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Trimble Pathfinder Pro-XL GPS Operation Manual	1
Sidewide CERCLA Quality Assurance Plan (SCQ)	2
<i>In-Situ</i> Gamma Spectroscopy Addendum to the Sitewide CERCLA Quality Assurance Plan	3

3.3 INDEPENDENT ASSESSMENT

Independent assessment will be performed by the FEMP Quality Assurance (QA) organization by conducting a surveillance. At a minimum, one surveillance will be conducted, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillance will be planned and documented in accordance with Section 12.3 of the SCQ.

3.4 IMPLEMENTATION OF CHANGES

Before the implementation of changes, the Characterization and Sampling Manager will be informed of the proposed changes. Once the Characterization and Sampling Manager has obtained written or verbal approval (electronic mail is acceptable) from the Area Project Manager and QA for the changes to the PSP, the changes may be implemented. Changes to the PSP will noted in the applicable field activity logs and on a Variance Request/Field Change Notice Form (VR/FCN). QA must receive the completed VR/FCN, which includes the signatures of the Characterization and Sampling Manager, Area Project Manager, and QA within 7 days of implementation of the change.

4.0 EQUIPMENT DECONTAMINATION

Sampling equipment that contacts the sample media will be decontaminated at Level II per Procedure SMPL-01(Section 6.11) "Solids Sampling" prior to transport to the field and between sample intervals to limit the introduction of contaminants from equipment to sample media and protection of worker safety and health. Other equipment that does not fully contact the media to be sampled may be decontaminated at Level I, or wiped down using disposable towels (e.g., drive head, etc.).

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5.0 HEALTH AND SAFETY

All work will be performed in accordance with applicable Environmental Monitoring Project Procedures, RM-0021, Safety Performance Requirements Manual, FDF Work Permit, Radiation Work Permit, Penetration Permit, and other applicable permits. Concurrence with applicable safety permits by each team member assigned to this project will be indicated by signing the briefing record.

All FDF and subcontract personnel working on any portion of the project that utilizes a subcontractor drilling company will be briefed on and comply with the Project Specific Health and Safety Matrix.

The Field Safety Contact will ensure that each team member performing sampling related to this project has been briefed on the applicable permits and the Project Specific Health and Safety Matrix, as applicable. Additionally, team members must be trained to applicable procedures listed in Section 3.2. Personnel who do not sign the Health and Safety documents or who are not trained to the applicable procedures will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of the applicable safety permits/surveys issued for worker safety and health will be available at each sample location area.

All emergencies shall be reported immediately to the site communication center at 648-6511, or 911, or contact "control" on the radio.

6.0 WASTE DISPOSITION

During sampling activities, the field sampling team may generate contact waste and decontamination waste. These waste streams will be managed in accordance with SCEP Waste Disposition Support Services (WDSS) through the Project Waste Identification Document (PWID) process. Generation of decontamination waters will be minimized in the field; wherever possible, equipment will be decontaminated at a facility that discharges to the AWWT, either directly or indirectly through the stormwater collection system. Contact waste generation will be minimized by limiting contact with the sample media, and by using only necessary disposable materials. This waste stream will be evaluated against dumpster criteria using the PWID process. If the materials do not meet dumpster criteria, an alternative disposal option will be identified. The Waste Disposition Contact will be contacted by the Area Project Manager prior (one week if possible) to the start of boring activities to initiate the PWID process.

7.0 DATA MANAGEMENT

A data management process will be implemented during the PSP to properly manage collected information upon completion of the field activities and to supplement existing information that will be used for remedial design and remedial action. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log (FAL) in sufficient detail so that the sampling team may reconstruct a particular situation without reliance on memory. Sample Collection Logs, and Borehole Abandonment Records will be completed according to instructions specified in Appendix B of the SCQ and applicable procedures.

Real time data will be evaluated for accuracy using the Real-Time Electronic Data Quality Control checklist (7-1).

Field documentation, such as the FAL, will undergo an internal QA/QC review by field team members. Field packages will be validated by the QA validation team and forwarded to data entry personnel who will input the field data into the Oracle system.

Analytical data from on-site and off-site laboratories will be reported in preliminary form to the Area Project Manager by the laboratory contact as soon as the data are available in the FACTS database. Following validation of the data for each sample release, the data for that release will be reported to the Project Characterization Lead in the final data report format. The CUs as specified in Appendix B will be validated by the QA validation team. Qualified data will be entered into the Sitewide Environmental Database.

REFERENCES

U. S. Department of Energy, 1998a, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

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**APPENDIX A
UNCONTROLLED
DATA QUALITY OBJECTIVES**

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Control Number 2542

Fernald Environmental Management Project

Data Quality Objectives

Title: Sitewide Certification Sampling and Analysis

Number: SL-043

Revision: 0

Effective Date: July 11, 1997

Contact Name: Eric Kroger

Approval: (signature on file) Date: 7/14/97
William D. Kelley
DQO Coordinator

Approval: (signature on file) Date: 7/14/97
Keith Nelson
Project Lead

Rev. #	0						
Effective Date:	7/14/97						

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DATA QUALITY OBJECTIVES
Sitewide Certification Sampling and Analysis

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field sampling, statistics, laboratory analytical methods and data management.

Conceptual Model of the Site

Soil is considered contaminated if the concentration of one or more area-specific constituents of concern (ASCOCs) in a certification unit (CU) exceed the final remediation levels (FRLs), as published in the operable unit Records of Decision. The extent of soil contamination was estimated and published in the Operable Unit (OU) 5 Feasibility Study (FS). These estimates were based on kriging analysis of available uranium data for soil collected during the Remedial Investigation (RI) effort and other FEMP environmental studies. Maps outlining contaminated soil boundaries were generated for the OU5 FS by overlaying the results of the kriging analysis of uranium data with isoconcentration maps of the other constituents of concern (COCs), as presented in the OU5 RI report, and further modified by spatial analysis of maps reflecting the most current soil characterization data. A sequential remediation plan has been presented which subdivides the FEMP into seven major construction areas. Extensive historical sampling has demonstrated that in each of these seven areas, a subset of the ASCOCs is present. These ASCOCs need to be evaluated against soil FRLs in the certification process within each of the individual construction areas, and at off-property locations against off-property soil FRLs. The certification sampling and analysis program supports a sequential process for site remediation by documenting that each of these seven construction areas, or phase areas within the construction areas, have met their area-specific soil FRLs published in the specific Operable Unit Records Of Decision (RODs).

1.0 Statement of Problem

Soils contaminated by former FEMP operations need to be certified for compliance with the FRLs of all ASCOCs. The appropriate sampling, analytical and data management criteria must be developed to provide the required qualified data necessary for certification compliance. For every area undergoing certification, a sampling plan must be in place that will direct soil samples to be collected which are representative of the ASCOC concentrations. The appropriate analytical methodologies must be selected to provide the required data.

Exposure to Soils

The cleanup standards, or FRLs, were developed for a final site land use as an undeveloped park. Under this exposure scenario, receptors could be directly exposed to contaminated soils through dermal contact (non-radiological COCs),

external radiation (radionuclides), incidental ingestion, and/or inhalation of fugitive dust while visiting the park. Exposure to contaminated soil by the modeled receptor is expected to occur at random locations within the boundaries of the FEMP and would not be limited to any single area. Some soil FRLs were developed based on the modeled cross-media impact potential of soil contamination to the underlying aquifer. In these instances, potential exposure to contaminants would be indirect through the groundwater pathway, and not directly linked to soil exposure. Benchmark Toxicity Values (BTVs) are also being considered in the cleanup process by assessing habitat impact for individual BTVs under post-remedial conditions.

Available Resources

Time: Certification sampling will be accomplished by the field team of samplers prior to final regrading or release of soils for construction activities. The certification sampling schedule must allow sufficient time, in the event additional remediation is required, to demonstrate certification of FRLs prior to permanent construction or regrading. Certification sampling will have to be completed and analytical results validated prior to submission of a certification report to the regulatory agencies.

Project Constraints: Certification sampling and analytical testing must be performed with existing manpower and materials to support the certification effort.

Construction areas are prioritized for certification sampling and analysis according to the date required for initiation of sequential construction activities in those areas. Remediation began with the excavation of Area 1 Phase 1 in the fall of 1996. Fluor Daniel Fernald (FDF) and DOE must demonstrate post-remedial compliance with the FRLs in designated construction areas to release the areas for planned construction activities, interim grading, and eventual restoration under the Natural Resources Restoration Plan (NRRP).

2.0 Identify the Decision

Decision

Demonstrate, on a CU basis in areas to be certified, whether the average concentration of each ASCOC is below the FRL and within the agreed upon confidence limits (95% for primary ASCOCs and 90% for secondary ASCOCs). Also, demonstrate that no result for any ASCOC is more than two times the associated soil FRL.

Possible Results

1. The average concentration of each ASCOC within the CU can be demonstrated to be below the FRLs within the confidence level, with no single result for any ASCOC greater than two times the associated FRL. The CU can then be certified as having achieved cleanup standards.
2. The average concentration of at least one ASCOC for a CU is demonstrated

to be above the FRL at the given confidence level. The CU will fail certification and require additional FDF management assessment.

3. If a result(s) of any one of the ASCOCs for the CU is demonstrated to be two times the FRL, the CU will fail certification. The CU will fail certification and require additional FDF management assessment. A combination of results 2 and 3 also constitutes certification failure.

3.0 Inputs That Affect the Decision

Required Information

Based on analytical results of certification sampling, the average concentrations of ASCOCs in individual CUs, using agreed-upon confidence levels, will be calculated using the statistical approach referenced in the Sitewide Excavation Plan (SEP) and individual PSPs.

Source of Information

Analysis of certification samples for ASCOCs will be conducted at analytical support level (ASL) D(chemical) and D*(radiological) in accordance with methods and QA/QC standards in the FEMP Sitewide CERCLA Quality Assurance Project Plan [SCQ (DOE 1993)] with modifications made for radiological analyses to modify the detection limits requirements to the project. The QA/QC standards include field duplicate samples with minimum frequency of one per CU or 1 per 20 samples, whichever is more frequent. Field record logs will be validated to verify that field activities provide the required samples for CU certification.

Contaminant-Specific Action Levels

The cleanup levels are the soil FRLs published in the OU5 ROD (see Table 1). In the Area 2, Phase I (A2PI) Integrated Remedial Design Package (IRDP) for each construction area, a subset of the compounds listed in Table 1 will be selected as ASCOCs for each of the individual construction areas, and will be certified for the associated FRLs. In the A2PI Southern Waste Units, the list of ASCOCs is defined in the OU2 ROD, while the more stringent of the OU2 and OU5 FRLs for these ASCOCs are established as the FRLs for this project. Table 2 identifies the subset of ASCOCs and FRLs for A2PI. BTVs being considered in the remediation process are published in the OU5 Ecological Risk Assessment and are being reviewed for site consideration in the (NRRP).

Methods of Sampling and Analysis

Samples will be collected in accordance with the PSPs and applicable site sampling procedures. Laboratory analysis for ASCOCs will be conducted at ASL D (chemical) and D* (radiological) using QA/QC protocols specified in the SCQ. For radiological analyses, the Highest Allowable Minimum Detection Capability (HAMDC) may be modified to adapt to the FRLs, instead of the RI/FS detection limits which were the

basis for the SCQ. Full raw data deliverables will be required from the laboratory to allow for complete data validation. For FEMP-approved on- and off-site laboratories, methodologies will be evaluated prior to use to verify that they have the required precision and detection capabilities necessary to achieve FRL analyte ranges.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: The boundaries of this certification DQO extend to all post-excavation surface soil in areas that are undergoing certification as part of FEMP remediation.

Population of Soils: Surface soil includes all excavated surfaces, defined sub-surface intervals, and undisturbed, relatively unimpacted native soils in areas undergoing certification sampling and analysis.

Scale of Decision Making

Based on considerations of the final certification units and the constituent of concern evaluation process, the ASCOCs for specific areas were determined. The area undergoing certification will be evaluated on a CU basis as to whether it has passed or failed the certification criteria.

Temporal Boundaries

Time frame: Certification sampling must be performed in time to sequentially release certified areas for scheduled construction, regrading, and other final land use activities. Certification sampling data must be received from the laboratory, evaluated and compiled, and final certification reports written, issued, and submitted to the regulatory agencies for their review, prior to release of the areas for construction, regrading or other final land use.

Time Constraints on Sampling: The scheduling of certification must allow time for the collection of samples, analysis, data verification and validation, and development of the certification reports. The certification report must be submitted to the regulators for their concurrence prior to the beginning of construction and/or regrading in the applicable work area.

Practical Considerations: Some areas undergoing remediation will be made accessible for certification sampling by decontamination/demolition and excavation. Other areas such as wooded land that is not planned for excavation may require preparation, such as cutting of grass or removal of undergrowth prior to certification sampling, thus requiring coordination with FEMP Maintenance personnel.

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5.0 Decision Rule

Parameters of Interest

The parameters of interest are the average surface soil concentrations of ASCOCs and confidence limits on the calculated average within a CU. Table 1 contains a list of sitewide soil constituents of concern (COCs) developed by OU5, a subset of which will be selected as ASCOCs for each construction area undergoing certification sampling and analysis. Area 2, Phase 1 (A2PI, the Southern Waste Units) is an exception, as a list of ASCOCs and FRLs developed by OU2 must also be considered when establishing A2PI Final FRLs (see Table 2). In addition, all parameters evaluated for WAC attainment or certification readiness will be included in the suite of parameters to certify.

Action Levels

The action levels are specific to the construction area. They are the soil FRLs published in the OU5 ROD for each ASCOC, except in Area 2, Phase 1 where the more stringent of the combined sets of OU2 and OU5 soil FRLs has been established as the FRL for each of the OU2 ASCOCs as discussed above.

Decision Rules

If the average radiological and chemical contamination for each ASCOC in each CU is demonstrated to be below the FRLs within the agreed upon confidence level (95% for primary COCs; 90% for secondary COCs), and no analytical result exceeds two times the soil FRL, then the CU can be certified as complying with the cleanup criteria. If a CU does not meet the FRLs within the agreed upon confidence level for one or more ASCOCs, or one or more analytical results for one or more ASCOCs is greater than two times the associated soil FRL, then the failed CU requires additional FDF management assessment.

6.0 Use of Data to Test Null Hypothesis

Based on the certification analytical data, the following formula will be used to test the null hypothesis for the soil concentration of each ASCOC within a CU subjected to certification sampling and analysis:

$$t = \frac{FRL - \bar{x}_i}{\sqrt{S_i^2/(n)}}$$

where:

t = critical value

FRL = final remediation level

\bar{x}_i = mean of the i^{th} CU

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S^2_i = sample variance of the i^{th} CU
 n = number of samples from the i^{th} CU.

If the computed value (t) exceeds the critical value of a t -distribution for $\alpha = 0.05$ for primary ASCOCs and 0.10 for secondary ASCOCs, at $n-1$ degrees of freedom, then the null hypothesis is rejected and the CU is certified as having average ASCOC concentrations below the applicable FRL.

7.0 Limits on Decision Errors

Range of Parameter Limits

The expected and reasonable range of ASCOC concentrations in soils undergoing certification sampling is from natural background (for COCs with natural background levels) to the expected post-remedial action level; however, the upper limit could be greater than the maximum values identified in the soils database.

Types of Decision Errors and Consequences

Definition

Decision Error 1: This decision error occurs when the decision maker decides a CU is in compliance with FRLs (average below the FRL) when in reality the actual average and/or confidence level is still above one or more FRLs. This situation could result in an increased risk to human health and the environment. In addition, this type of error could result in regulatory fees and penalties.

Decision Error 2: This decision error occurs when the decision maker decides a CU is contaminated (average at or above the FRL) when the CU average is actually below the action level(s). This error would result in unnecessary added costs due to the excavation of allowable residual soils and increased volume of soils assigned to the OSDF. In addition, unnecessary delays in the remediation schedule may result.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual average concentration of an ASCOC in soil is greater than the action level. The true state of nature for Decision Error 2 is that the actual average concentration of an ASCOC is below the action level for FRLs. Decision Error 1 is the more severe error due to potential threat this poses to human health and the environment.

Null Hypothesis

H_0 : The average concentration of at least one ASCOC in the CU is equal to or greater than the action levels.

H_1 : The average concentration of all ASCOCs in the CU is less than the action levels.

False Positive and False Negative Errors

A false positive is Decision Error 1: less than or equal to five percent is considered the acceptable decision error in determination of compliance with FRLs for primary ASCOCs, while ten percent is used for secondary ASCOCs.

A false negative is Decision Error 2: less than or equal to 20 percent is considered the acceptable decision error. This decision error is controlled through the determination of sample sizes (See Section 8.0)

8.0 Design for Obtaining Quality Data

General Sampling and Analysis Design

A sampling design will be developed to collect discrete samples from each CU. Discrete samples will be collected using a systematic random sampling grid by dividing each CU into 16 approximately equal subunits. A sample point will be randomly located within each subunit, and sampled using approved methodology, as described in the Project Specific Plans (PSPs). A specified quantity of soil will be obtained from each sample point in order to satisfy analytical requirements.

Each sample will be submitted to FEMP-approved laboratories for the appropriate ASL D (chemical) or D* (radiological) analysis (acceptable analytical methods and/or performance criteria are defined in the FEMP SCQ). For radiological analyses, the Highest Allowable Minimum Detection Capability (HAMDC) may be modified to adapt the data quality to the FRLs, instead of the RI/FS detection limits which were the basis for the SCQ. FDF will specify to the laboratory the appropriate number and type of method QA/QC samples based on the type of analysis and number of samples as defined in the SCQ. Laboratory data deliverables will include summary forms and raw data. Selected methodologies will be reviewed prior to use to insure that they provide sufficient sensitivity and precision.

Field QC will include field duplicates at a minimum frequency of one per CU or 1 per 20 samples, whichever is more frequent. Rinsates of sampling material will be performed where equipment is reused. Although required at ASL D, traditional field blanks will not be collected since areas being certified have been characterized as not exhibiting impacts from site contamination. A limited number of rinsates of the sleeves used as sample containers will be used as container blanks, to provide a level of confidence that these containers are not a source of contamination. Trip blanks will be collected for volatile organic sampling.

A 100% review of the data per the requirements of the PSP, including a minimum of 10% field validation and 10% full data validation of data packages to ASL D, will be performed by either the FDF validation team or subcontract validation team.

Resource Effective Design

The number of samples required to demonstrate statistical confidence is determined based on variability of existing historical sample data in areas not contaminated above the FRLs. The minimum number of samples determined per CU (reference the SEP) represent the number of samples required to minimize decision errors in the estimate of the mean under a discrete sampling program. This sampling program is based on the assumptions of variability, maximum expected mean soil concentrations, and acceptable probabilities of error. The maximum expected mean soil concentration is based on engineering design, and estimates that the average concentrations of ASCOCs anticipated in post-remediation in residual soil is assumed to be 75% of the FRL. For simplicity, and to assure that the ASCOCs will be adequately sampled to achieve acceptable confidence levels, the minimum number of samples required to meet the confidence level for the group of primary COCs and the group of secondary COCs has been selected to achieve the desired confidence for all COCs within primary and secondary groups. Any additional samples per CU taken beyond the minimum as directed in individual certification PSPs will be included in the average ASCOC concentrations.

Details and Assumptions of the Design

The number of samples required to achieve statistical confidence is determined from the following equation:

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{\left(\frac{FRL - \bar{x}_{target}}{S_{CA}}\right)^2}$$

Where:

- n = number of samples required for statistical confidence
- α = probability of a Type I Error (.05) (.10 - secondary)
- β = probability of a Type II Error (.20)
- FRL = the FRL for the given analyte
- \bar{x}_{target} = target cleanup level average concentration = 75% of the FRL
- S_{CA} = standard deviation estimated from clean areas (see discussion below)
- $(Z_{1-\alpha} + Z_{1-\beta})^2$ = the critical values for the normal distribution with probabilities $1-\alpha$ and $1-\beta$.

The target level prior to certification is assumed to be 75% of the FRL, i.e., the average soil concentration is no greater than 75% of the FRL.

An estimate of the variability (S_{ca}) for post-remedial conditions was based on estimates calculated from existing site characterization data. The concept was that the variability demonstrated in unimpacted areas would be similar to post-remedial

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conditions in impacted areas. The procedure used to estimate the clean area variability is as follows:

1. The site was divided into 100 ft. by 100 ft. blocks. This was accomplished by simply dividing the Northing and Easting coordinate by 100 since these coordinates are presented in feet.
2. Block averages were calculated based on historic data within each 100'x100' block for each COC evaluated.
3. Blocks were then categorized as either impacted (average greater than or equal to the FRL) or unimpacted (average less than the FRL).
4. All sample locations that were located in impacted blocks were then eliminated from consideration.
5. The final screening removed any individual sample that was in excess of three times the FRL since these sample values would immediately trigger a localized remedial effort.
6. From this residual (unimpacted) data set, the variability used in the equation was calculated.

Data Quality Objectives
Sitewide Certification Sampling and Analysis

1A. Task/Description: Certification Sampling Analysis

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R_vA ☐ OTHER

1.C. DQO No.: SL-043 DQO Reference No.: _____

2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐ Soil ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) _____

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization

A ☐ B ☐ C ☐ D ☐ E ☐

Risk Assessment

A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives

A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design

A ☐ B ☐ C ☐ D ☐ E ☐

Monitoring during remediation activities

A ☐ B ☐ C ☐ D ☐ E ☐

Other

A ☐ B ☐ C ☐ D ☒* E ☐ (Certification)

* Radiochemistry data will be specified as ASL E in the task orders, to allow the HAMDCs to be tailored to the project requirements, however, since all other QC is identical to the ASL D specifications in the SCQ, it is referred to in this task order as ASL D*, to better connote the designated QC requirements

4.A. Drivers: Construction Area Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD)

4.B. Objective: Confirmation that excavation activities have remediated the site to below the Final Remediation Level (FRL) for area-specific constituents of concern.

5. Site Information (Description):

The OU2 and OU5 RODs have identified areas at the FEMP that require soil remediation activities. The RODs specify that the soils in these areas will be demonstrated to be below the FRLs. Certification will be necessary for areas of the site with soils that have been remediated to demonstrate that the residual soils do not contain contamination exceeding these levels at a specified confidence level.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	<input type="checkbox"/>	2. Uranium	<input checked="" type="checkbox"/> *	3. BTX	<input type="checkbox"/>
Temperature	<input type="checkbox"/>	Full Radiological	<input checked="" type="checkbox"/> **	TPH	<input type="checkbox"/>
Specific Conductance	<input type="checkbox"/>	Metals	<input checked="" type="checkbox"/> **	Oil/Grease	<input type="checkbox"/>
Dissolved Oxygen	<input type="checkbox"/>	Cyanide	<input type="checkbox"/>		
Technetium-99	<input checked="" type="checkbox"/> **	Silica	<input type="checkbox"/>		
4. Cations	<input type="checkbox"/>	5. VOA	<input checked="" type="checkbox"/> **	6. Other (specify)	
Anions	<input type="checkbox"/>	BNA	<input type="checkbox"/>		
TOC	<input type="checkbox"/>	Pesticides	<input checked="" type="checkbox"/> **		
TCLP	<input type="checkbox"/>	PCB	<input checked="" type="checkbox"/> **		
CEC	<input type="checkbox"/>				
COD	<input type="checkbox"/>				

* Total Uranium calculated from sum of uranium isotopes analyzed in gamma spectroscopy.

** See Tables 1 and 2.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A _____	SCQ Section: _____
ASL B _____	SCQ Section: _____
ASL C _____	SCQ Section: _____
ASL D <u>Per SCQ, PSP and Task Order</u>	SCQ Section: <u>APP. G, Tables 1 & 3</u>
ASL E _____	SCQ Section: _____

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased ☒ Composite ☒ Environmental ☐ Grab ☒ Grid ☐
Intrusive ☒ Non-Intrusive ☐ Phased ☐ Source ☐

DQO Number: SL-043

7.B. Sample Work Plan Reference: Project Specific Plan for the associated construction area Remedial Action Work Plan

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: Associated PSP(s), SMPL-01

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	<input checked="" type="checkbox"/> *	Container Blanks	<input type="checkbox"/>
Field Blanks	<input checked="" type="checkbox"/> **	Duplicate Samples	<input checked="" type="checkbox"/>
Equipment Rinsate Samples	<input checked="" type="checkbox"/> **	Split Samples	<input checked="" type="checkbox"/> ***
Preservative Blanks	<input type="checkbox"/>	Performance Evaluation Samples	<input type="checkbox"/>

Other (specify)

*Collected for volatile organic sampling

** Limited rinsate sample(s) of the casings will be analyzed for metals and other applicable analytes of concern to provide a level of confidence that the casings are not a source of contaminants that would impact the levels of concern. Traditional field blanks will not be collected. Traditional rinsates will not be collected unless sampling equipment or shipping containers are reused.

*** Split samples will be collected where required by the EPA.

8.B. Laboratory Quality Control Samples:

Method Blank	<input checked="" type="checkbox"/>	Matrix Duplicate/Replicate	<input checked="" type="checkbox"/>
Matrix Spike	<input checked="" type="checkbox"/>	Surrogate Spikes	<input checked="" type="checkbox"/>
Tracer Spike	<input checked="" type="checkbox"/>		

Other (specify) _____

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

Sample density will be dependent upon the certification unit size. Proposed certification units will be identified in PSPs for each area.

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TABLE 1
SIDEWIDE CONSTITUENTS OF CONCERN WITH ASSOCIATED SOIL FRLs ^{a,b}

Analytical Suites	Sitewide Constituents of Concern	FRL
<u>Primary COCs</u>		
Radiological	Total Uranium ^c	82 mg/kg
	Total Uranium ^d	20 mg/kg
	Radium-226	1.7 pCi/g
	Radium-228	1.8 pCi/g
	Thorium-228	1.7 pCi/g
	Thorium-232	1.5 pCi/g
<u>Secondary COCs</u>		
Radiological	Cesium-137	1.4 pCi/g
	Lead-210	38 pCi/g
	Neptunium-237	3.2 pCi/g
	Plutonium-238	78 pCi/g
	Strontium-90	1.4 pCi/g
	Technetium-99	30 pCi/g
	Thorium-230	280 pCi/g
Metals	Arsenic	12 mg/kg
	Beryllium	1.5 mg/kg
	Lead	400 mg/kg
	Manganese	4600 mg/kg
Organics	Aroclor-1254	0.13 mg/kg
	Aroclor-1260	0.13 mg/kg
	Benzo(a)anthracene	20 mg/kg
	Benzo(a)pyrene	2 mg/kg
	Benzo(b)fluoranthene	20 mg/kg
	Carbazole	12 mg/kg
	Dibenzo(a,h)anthracene	2 mg/kg
	1,1-Dichloroethene	0.41 mg/kg
	Dieldrin	0.015 mg/kg
	Heptachlorodibenzo-p-dioxin	0.00088 mg/kg
	Indeno(1,2,3-cd)pyrene	20 mg/kg
	Octachlorodibenzo-p-dioxin	0.0088 mg/kg
	Trichloroethene	25 mg/kg

^aA subset of this list from the OU5 ROD composes the ASCOCs for each individual remediation area.

^bAdditional ASCOCs or more stringent FRLs may be identified in construction area Certification PSPs.

^cFor all soil outside of the Production Area, Sewage Treatment Plant and Fire Training Facility.

^dFor soil within the Production Area, Sewage Treatment Plant and Fire Training Facility.

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TABLE 2

AREA 2, PHASE 1 AREA SPECIFIC CONSTITUENTS OF CONCERN WITH ASSOCIATED SOIL FRLs ^a

Analytical Suites	Sitewide Constituents of Concern ^b	FRL
<u>Primary COCs</u>		
Radiological	Total Uranium	24.8 mg/kg
	Radium-226	1.7 pCi/g
	Radium-228	1.8 pCi/g
	Thorium-228	1.7 pCi/g
	Thorium-232	1.5 pCi/g
<u>Secondary COCs</u>		
Radiological	Neptunium-237	3.2 pCi/g
	Technetium-99	30 pCi/g
	Thorium-230	280 pCi/g
	Uranium-234	4.42 pCi/g
	Uranium-235/236	3.35 pCi/g
	Uranium-238	3.22 pCi/g
Metals	Arsenic	12 mg/kg
	Lead	400 mg/kg
Organics	Aroclor-1260	0.13 mg/kg
	Benzo(a)anthracene	0.455 mg/kg
	Benzo(a)pyrene	0.777 mg/kg
	Benzo(b)fluoranthene	0.513 mg/kg
	Benzo(k)fluoranthene	0.603 mg/kg
	Dibenzo(a,h)anthracene	0.157 mg/kg
	Dieldrin	0.015 mg/kg
	Phenanthrene	0.19 mg/kg

^aArea 2, Phase I is the only remediation area with ASCOCs/FRLs different from those identified as sitewide COCs in the OU5 ROD, as seen on Table 1.

^bTaken from the OU2 ROD; the most stringent FRL from OU2 or OU5 ROD is used.

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Fernald Environmental Management Project

Data Quality Objectives

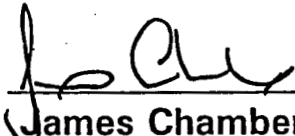
Title: Real Time Precertification Monitoring

Number: SL-054

Revision: 0

Effective Date: 6/03/99

Contact Name: Joan White

Approval: 
James Chambers
DQO Coordinator

Date: 6/3/99

Approval: 
Joan White

Date: 6/3/99

Real-Time Instrumentation Measurement
Program Manager

Rev. #	0						
Effective Date:	6/03/99						

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Data Quality Objectives Real Time Precertification Monitoring

1.0 Statement of Problem

Conceptual Model of the Site

The general soil remediation process at the Fernald Environmental Management Project (FEMP) includes real-time *in-situ* gamma spectrometry (real-time) measurements and physical sampling during different phases of the remediation process. Initially, pre-design investigations define excavation boundaries. During excavation, real-time measurements and/or sampling for waste disposition issues occurs. After planned excavations are complete, real-time measurements and/or physical sampling precertification activities are carried out to verify that residual contamination is low enough to pass certification. Finally, certification physical sampling is performed to verify that clean up goals (i.e., Final Remediation Levels, [FRLs]) have been achieved, and therefore, remediation is complete in that portion of the FEMP.

This DQO describes the real-time in-situ gamma spectrometry methods used during precertification. Any physical soil samples collected during precertification will be collected under a separate DQO. Real-time precertification measurements involves field surveys of the surface soil using mobile and stationary gamma-discernable real-time equipment. Real-time precertification measurements take place within a soil remediation area when the expected concentrations of primary radiological constituents of concern (COCs) are expected to be below the respective final remediation levels (FRLs). This may occur over an excavated surface or on an unexcavated surface where no above-FRL contamination is anticipated.

Precertification scanning activities must follow the guidelines established in the *Sitewide Excavation Plan* (SEP) and the most current version of the document *User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site* (hereinafter referred to as the Real Time Users Manual). As discussed in these documents, precertification measurements are conducted in two separate activities:

- Precertification Phase I includes a mobile sodium iodide (NaI) detector scan of as much of the area as accessible. If parts of the area of interest are inaccessible to the mobile NaI detectors, then the stationary High Purity Germanium (HPGe) detector will be used to obtain measurements in those areas. Target parameters for Precertification Phase I NaI measurements are gross gamma activity and 3-times the FRL (3x FRL) values of total uranium, radium-226 and/or thorium-232, as calculated by a moving two-point average of consecutive measurements, or as indicated by 3x FRL in single measurements using the HPGe detectors.

- Precertification Phase II includes stationary HPGe detector measurements to verify the highest values obtained by the mobile NaI detector. It also includes stationary HPGe "hot spot evaluation" measurements at Phase I locations where the two-point average of total uranium, radium-226 and/or thorium-232 has identified resolvable ASCOC concentrations greater than 3-times the FRL (3x FRL) using the RMS systems, or where single HPGe measurement from Phase I are greater than 3x FRL. Target parameters for Precertification Phase II are all resolvable radiological ASCOCs.

Available Resources

Time: Precertification of remediation areas or phased areas must be accomplished by the field team of real-time instrumentation operators (and samplers if necessary), to provide required information in time to support the soil certification effort.

Project Constraints: FEMP remediation activities are being performed in support of the Accelerated Remediation Plan, and soil remediation activities must be consistent with the SEP. Precertification scanning, and if necessary, sampling and analytical testing, must be performed with existing manpower and instrumentation, considering instrument availability, to support the remediation and certification schedule. The results of Precertification Phase I will determine Phase II HPGe measurement number and location, which, if necessary, will determine physical sample number and location. Certification and regrading of the site to meet final land use commitments is dependent on successful completion of this work.

Instrumentation: Real-time monitoring includes 2 mobile sodium iodide (NaI) systems referred to as the Radiation Measurement Systems (RMS). They are the RTRAK (mounted on a tractor) and the RSS (mounted on a small pushcart). In addition, the stationary germanium detectors mounted on a tripod (the HPGe), are also used. These instruments can significantly accelerate the pace of necessary characterization by detecting soil contaminated with resolvable radiological Area Specific Contaminants of Concern (ASCOCs) in a rapid and non-intrusive manner.

2.0 Identify the Decision

Decision

Precertification real-time measurements support two decisions:

Decision 1: Precertification Phase I measurements will be the basis of a decision for the location(s) and number of Precertification Phase II HPGe measurements to collect within an area potentially exceeding 3x FRL, and for Phase II measurements to confirm the highest mobile NaI systems total activity locations.

Decision 2: Precertification Phase II measurements will be the basis of a decision to either:

- 1) excavate residual contaminated soil, conduct additional real-time measurements, or conduct physical sampling to evaluate potential residual contamination. The decision to excavate would be made if residual contamination could possibly cause certification failure; or,
- 2) make the assumption that an area is likely to pass certification, and therefore, is ready for certification to begin.

Possible Results of Decision 1

The location and number of Phase II HPGe measurements to be obtained will be established based on Precertification Phase I NaI and HPGe measurements, and the target level specified in the PSP. Two-point averaging of the Phase I NaI measurements, and/or single HPGe measurements will determine ASCOC concentrations or activities with regard to 3x FRL, and this data will be mapped for review. This data will also be considered when establishing Certification Units (CUs).

If the area potentially exceeding 3x FRL exhibits a visible contamination boundary, the Project may determine that Phase II measurements may not need to be collected. In this event, the area of interest may be excavated, and Phase II HPGe measurements will be obtained on the newly excavated surface to ensure the area is now below 3x FRL.

Possible Results of Decision 2

Possible results are as follows:

- 1) The Phase II HPGe results for all gamma discernable target parameters indicate that the CU is likely to pass certification for widespread contamination and the hot-spot criteria. If this is the case, the area of interest is ready for certification.
- 2) The Phase II HPGe results for all gamma discernable target parameters indicate that the CU is not likely to pass certification for widespread contamination and/or the hot-spot criteria. If this is the case, additional real-time measurements and/or physical samples may be collected to delineate the contaminated soil for remedial excavation.

3.0 Identify Inputs That Affect the Decision

Required Informational Input

An area will not be subjected to precertification if above-FRL contamination is known to be present. Real-time precertification measurements will be used to estimate the surface soil contamination and the variation in surface soil contamination in areas scheduled for certification. In addition, physical samples

may be collected and/or a review of existing physical sample data, process knowledge, or visible observation may be performed.

Sources of Informational Input

Precertification measurements for discernible radiological COCs will involve measurements from mobile and stationary in-situ gamma spectrometry equipment. Physical samples may be collected to verify real-time measurements, or to precertify for non-gamma resolvable ASCOCs.

Action Levels

FRLs established in the OU2 and OU5 Records of Decision are specific for radiological COC, and in some cases, vary between remediation areas. The FRLs were developed to account for health risks, cross media impact, background concentrations, and applicable or relevant and appropriate requirements (ARARs) and represent not-to-be exceeded contaminant-specific average soil concentrations. Real-time HPGe measurements may also be taken to support excavation to ALARA requirements. Physical samples may be used to verify HPGe readings and to precertify for non-gamma resolvable ASCOCs.

The 3x FRL concentrations/activities obtained through two-point averaging of mobile NaI measurements have been developed based on the ability of the instrumentation to resolve these levels. Refer to the Real-Time User's Manual for additional details.

Methods of Data Collection

Precertification Phase I measurements will be utilized to obtain as close to complete coverage of the areas of concern. Hot spot confirmation and delineation measurements will be obtained during Precertification Phase II by strategically placed stationary HPGe measurements. Analysis and data management for Precertification Phase I data will be conducted at ASL A. Precertification Phase II data may be conducted at either ASL A or ASL B, at the discretion of the Project. The decision to collect Phase II data at ASL A, or ASL B will depend on the Project's need for validated data. Only ASL B data is subject to validation. Real-time data collection for Phase II ASL A and ASL B measurements are identical. All measurements will be performed in compliance with operating procedures, the Real-Time User's Manual, and the SEP.

The Precertification Phase I data will be utilized to establish general radiological concentration patterns and detect areas of elevated total gamma activity, as well as provide isotopic information for resolvable ASCOCs. The Precertification Phase II HPGe gamma detectors will be used to confirm and delineate Phase I potential hot spot measurements, as needed. All real-time Phase I and Phase II

measurements will be collected in accordance with the procedures identified in Section 7.C of this DQO.

Surface physical samples may be collected to verify HPGe measurements and to precertify for non-gamma resolvable ASCOCs. If physical sampling is needed, it will be identified in precertification PSPs. The data quality of these samples will be consistent with the latest sampling DQO.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: Boundaries are limited to surface soils of areas planned for certification, and adjacent areas, as defined in the individual work plans.

Population of Soils: The soils affected are surface soils (to a nominal depth of 6 inches), which include recently excavated surfaces and undisturbed soils associated with excavation areas as designated in the individual work plans.

Temporal Boundaries

Time Constraints on Real-Time Measurements: The scheduling of precertification scanning is closely associated with the excavation schedule. Precertification real-time scanning must be conducted after excavation, if any, and before certification activities begin. The scanning data must be returned and processed into useable format in time for the information to be useful within the current remediation schedule.

Practical Considerations: In-situ gamma spectrometry measurements cannot be made during snow coverage or standing water conditions or during precipitation. Field analytical methods should also be limited to unsaturated soils. Most areas undergoing scanning are flat, open terrain, and are readily accessible to the equipment. Some areas may require preparation, such as cutting of grass or removal of undergrowth, fencing and other obstacles. In situ measurements will require coordination with appropriate maintenance personnel for site preparation. Physical and environmental parameters will be recorded and assessed during data collection. Refer to the Real-Time User's Manual for additional details.

5.0 Develop a Logic Statement

Parameters of Interest

For Precertification Phase I, parameters of interest are gross gamma activity and 3-times the FRL values of total uranium, radium-226 and thorium-232, as calculated by a moving two-point average of consecutive readings. For Precertification Phase II, parameters of interest are all HPGe-discernable radiological ASCOCs.

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Precertification Target Levels

For Precertification Phase I, target levels are the highest gross gamma activity readings, and 3x FRL for total uranium, radium-226 and thorium-232. For Precertification Phase II, target levels are the FRLs of all discernable radiological ASCOCs.

Decision Rules

Following Precertification Phase I, any Phase I Nal areas exhibiting patterns of high gross gamma activity will be measured with the HPGe. Also, any Phase I HPGe measurements greater than 3x FRL will be scanned with the HPGe for hot spot evaluation per section 3.3 of the Real-Time User's Manual.

Following precertification Phase II, if HPGe results indicate a CU could fail certification, the soil may be evaluated further with additional HPGe measurements or physical samples, or undergo remedial excavations. If remedial excavations are performed, the excavated area will be measured with post-excavation HPGe measurements to ensure removal of the contamination. Once the remediation is confirmed completed by the HPGe, the area will be considered ready for certification. Certification readiness means there is no indication of wide-spread contamination, or localized contamination (i.e., hot-spot).

6.0 Establish Constraints on the Uncertainty of the Decision

Range of Parameter Limits

The range of soil concentrations anticipated will be from background (natural concentrations) to greater than the maximum subsurface value indicated in the RI database. It is anticipated that the concentrations will be below the FRL prior to the onset of precertification sampling.

Types of Decision Errors and Consequences

Decision Error 1: This decision error occurs when the decision maker decides an area is ready for certification when the average soil concentration in an area is above the FRL, or the soil contains ASCOC concentrations above two-times the FRL (the hot-spot criteria). This decision error would lead to the area failing certification for average radiological COC concentrations above the FRL or for hot spot criteria. If an area fails certification sampling and analytical testing, remobilization and further excavation, precertification, and certification sampling would be necessary.

Decision Error 2: This decision error occurs when the decision maker decides that additional HPGe and/or physical samples are necessary based on precertification Phase II results; or the decision maker directs the excavation (or additional excavation) of soils, when they actually have average radiological COC concentrations below the FRLs and no ASCOC hot spots (i.e., concentrations above two-times the FRL). This would result in added sampling and analytical costs and/or added costs due to the excavation of clean soils and an increased volume in the OSDF. This is not as severe as Decision Error 1. The addition of clean soil to the OSDF would result in further reduction, although minimally, to human health risk in the remediated areas.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentrations of radiological ASCOCs are greater than their FRLs and/or the hot spot criteria. The true state of nature for Decision Error 2 is that the true concentrations of COCs are below their FRLs and/or hot spot criteria. Decision Error 1 would be the more severe error.

7.0 Optimize a Design for Obtaining Quality Data

As discussed in Section 3.3.3 of the SEP, precertification scanning consists of two separate activities. Refer to Section 1.0 of this DQO for a general overview of Precertification Phase I and Precertification Phase II activities.

Real-time measurements are generated by two methods: 1) the mobile sodium iodide (NaI) detection systems (RTRAK or RSS) which provide semi-quantitative radiological data, and 2) the stationary high purity germanium (HPGe) system that provides quantitative measurements of radiological COCs. If necessary, physical samples may also be collected for HPGe data verification, and to precertify for non-gamma resolvable ASCOCs.

Surface moisture readings are obtained in conjunction with Phase I and Phase II the NaI and HPGe system measurements using the Troxler nuclear moisture and density gauge or the Zeltex moisture meter, as specified in the PSP. If conditions do not permit the use of the moisture meters, a soil moisture sample may be collected and submitted to the on-site laboratory for percent moisture analysis, or a default moisture value of 20% may be used. The soil moisture data will be used as is discussed in Sections 3.8, 4.11 and 5.2 of the Real-Time User's Manual. The gamma data will be computer corrected for moisture by the Lab View software.

Background radon monitoring will also occur in conjunction with Phase I and Phase II NaI and HPGe system measurements, as specified in the PSP. Refer to the Section 5.3 of the Real-Time User's Manual for a discussion on radium-226 corrections.

Sodium Iodide (NaI) System

The mobile NaI detector systems are collectively called the Radiation Measurement Systems (RMS). They are used to achieve as close to complete coverage of the area as possible, taking into consideration the topographic and vegetative constraints which limit access. The NaI systems currently are used to obtain measurements over an area specified in a PSP to detect radiological total activity patterns and elevated radiological activity. The NaI detector systems are used at speeds and count times specified in the PSP, and are consistent with the Real-time User's Manual. The 0.4 meter overlap option is used, as discussed in Section 4.3.1 of the Real-time User's Manual, unless directed differently in the PSP. If the total uranium FRL is 20 ppm or lower, the NaI systems should not be used for precertification; the HPGe system should be used.

The mobile NaI systems are electronically coupled with Satloc global positioning system (GPS) rover and base unit to record each reading location. Counting and positioning information is recorded continuously on a field personal computer (PC) and stored on disk or hard drive for future downloading on the site soil database and Graphical Information System (GIS) system, or transferred directly to the Local Area Network (LAN) by Ethernet.

Information from the NaI/GPS system is recorded on the PC and transferred to the Unix system through the local area network on a regular (at least daily) basis. The information is plotted on the FEMP GIS system, or in the field using Surfer software. With the output, patterns of elevated total activity, and locations of elevated concentrations can be identified.

Data reduction is an important aspect of NaI system data use. Individual total uranium, radium-226 and thorium-232 concentrations will undergo two-point averaging. The two-point averaged values will be mapped and evaluated with respect to 3x FRL.

NaI measurements may be used for precertification decision making if the measurements clearly indicate below FRL criteria have been met. They may also be used to determine the location and number of Precertification Phase II HPGe measurements, if required.

In-Situ HPGe Detectors

The HPGe detector is used during Precertification Phase I or Precertification Phase II, as follows:

- During Precertification Phase I, the HPGe is used in areas where topographic or vegetative constraints prevent mobile NaI detector access or if the NaI systems are out of service. The HPGe is used in a 99.1% coverage grid over the accessible area. Detector height and count times are specified in

the PSP and are consistent with the most current version of the Real-Time User's Manual.

- During Precertification Phase II, the HPGe detector is used at strategic locations established thorough the Precertification Phase I screening. These locations are where the highest readings of gross gamma activity were identified and/or where individual ASCOC concentrations were identified as hot spots. The HPGe is used to quantify radiological COC levels, which in turn provide information concerning the ability to pass certification.

Physical Soil Sampling

Physical samples may be collected and analyzed for target radiological COCs to verify the HPGe measurements and/or to precertify for non-gamma discernable ASCOCs. If physical samples are required, they will be collected in compliance with the applicable sampling DQO. Criteria for obtaining physical samples, such as sample density, will be specified in the Precertification PSP, if necessary. The minimum data quality acceptable for this purpose will be identified in the applicable sampling DQO. Field QC, ASL and Validation requirements will be consistent with the SCQ and the more stringent Soil Characterization and Excavation Project requirements.

Data Quality Objectives
Real Time Precertification Measurements

- 1A. Task/Description: Precertification real-time measurements.
1B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R_vA ☐ OTHER ☐

1.C. DQO No.: SL-054, Rev. 0 DQO Reference No.: Current Sampling DQO

2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☒ Soil ☒
Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) _____

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization

A ☒ B ☒ C ☐ D ☐ E ☐

Risk Assessment

A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives

A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design

A ☐ B ☐ C ☐ D ☐ E ☐

Monitoring during remediation activities

A ☒ B ☒ C ☐ D ☐ E ☐

Other: Precertification

A ☒ B ☒ C ☐ D ☐ E ☐

- 4.A. Drivers: Applicable or Relevant and Appropriate Requirements (ARARs), Operable Unit 5 Record of Decision (ROD), the Real-Time User's Manual, the Sitewide Excavation Plan and the Pre-certification Project-Specific Plan (PSP).

- 4.B. Objective: To determine if the area of interest is likely to pass certification for all HPGe discernable radiological COCs
-

5. Site Information (Description): The OU2 and OU5 RODs have identified areas at the FEMP that require remediation activities. The RODs specify that the soils in these areas will be clean and demonstrated to be below the FRLs. Pre-certification will be necessary for areas of the site with soils that are scheduled for certification.

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6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	<input type="checkbox"/>	2. Uranium	<input checked="" type="checkbox"/> *	3. BTX	<input type="checkbox"/>
Temperature	<input type="checkbox"/>	Full Rad.	<input checked="" type="checkbox"/> *	TPH	<input type="checkbox"/>
Spec. Conductance	<input type="checkbox"/>	Metals	<input type="checkbox"/>	Oil/Grease	<input type="checkbox"/>
Dissolved Oxygen	<input type="checkbox"/>	Cyanide	<input type="checkbox"/>		
Technitium-99	<input type="checkbox"/>	Silica	<input type="checkbox"/>		
4. Cations	<input type="checkbox"/>	5. VOA	<input type="checkbox"/>	6. Other (specify)	
Anions	<input type="checkbox"/>	ABN	<input type="checkbox"/>	Percent Moisture	
TOC	<input type="checkbox"/>	Pesticides	<input type="checkbox"/>		
TCLP	<input type="checkbox"/>	PCB	<input type="checkbox"/>		
CEC	<input type="checkbox"/>				
COD	<input type="checkbox"/>				

* If specified in the PSP

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A <u>Mobile NaI, HPGe (Precert. Phase I) and HPGe (Precert. Phase II)*</u>	SCQ Section: <u>Not Applicable</u>
ASL B <u>HPGe (Precertification Phase II)*</u>	SCQ Section: <u>App. G, Table 1</u>
ASL C _____	SCQ Section: _____
ASL D _____	SCQ Section: _____
ASL E _____	SCQ Section: _____

* Choosing the ASL level for Phase II precertification HPGe measurements is at the discretion of the project considering the project need for validated data.

7.A. Sampling Methods: (Put an X in the appropriate selection.)

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Biased ☒ Composite ☐ Environmental ☐ Grab ☒ Grid ☒
Intrusive ☐ Non-Intrusive ☒ Phased ☐ Source ☐

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the Project-Specific Plans.

Background samples: OU5 RI/FS

7.C. Sample Collection Reference:

- EQT-22, *Characterization of Gamma Sensitive Detectors*
- EQT-23, *Operation of High Purity Germanium Detectors*
- EQT-32, *Troxler 3440 Series Surface Moisture Gauge*
- EQT-33, *Real Time Differential Global Positioning System*
- EQT-39, *Zeltex Infrared Moisture Meter*
- EQT-40, *Satloc Real-time Differential Global Positioning System*
- EQT-41, *Radiation Measurement Systems*
- ADM-16, *In-Situ Gamm Spectrometry Quality Control*
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, 20701-RP-0006*

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	<input type="checkbox"/>	Container Blanks	<input type="checkbox"/>
Field Blanks	<input type="checkbox"/>	Duplicate Samples	<input checked="" type="checkbox"/> *
Equipment Rinsate Samples	<input type="checkbox"/>	Split Samples	<input type="checkbox"/>
Preservative Blanks	<input type="checkbox"/>	PE Samples	<input type="checkbox"/>
Other (specify) _____			

* If specified in the PSP.

8.B. Laboratory Quality Control Samples:

Method Blank	<input type="checkbox"/>	Matrix Duplicate/Replicate	<input type="checkbox"/>
Matrix Spike	<input type="checkbox"/>	Surrogate Spikes	<input type="checkbox"/>
Other (specify) _____			

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX B

**SAMPLE IDENTIFIERS, TARGET ANALYTE LISTS,
LOCATION AND VALIDATION INFORMATION**

APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

2542

Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-01	A1PII-S3UT-01-01G	HPGe	480006.64	1350965.20	N/A
A1PII-S3UT-01	A1PII-S3UT-01-01GD	HPGe	480006.64	1350965.20	N/A
A1PII-S3UT-01	A1PII-S3UT-01-01M	TAL B	480006.64	1350965.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-01MD	TAL B	480006.64	1350965.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-01R	TAL A	480006.64	1350965.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-01RD	TAL A	480006.64	1350965.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-02G	HPGe	480005.64	1350997.40	N/A
A1PII-S3UT-01	A1PII-S3UT-01-02M	TAL B	480005.64	1350997.40	Level C
A1PII-S3UT-01	A1PII-S3UT-01-02R	TAL A	480005.64	1350997.40	Level C
A1PII-S3UT-01	A1PII-S3UT-01-03G	HPGe	480004.65	1351029.50	N/A
A1PII-S3UT-01	A1PII-S3UT-01-03M	TAL B	480004.65	1351029.50	Level C
A1PII-S3UT-01	A1PII-S3UT-01-03R	TAL A	480004.65	1351029.50	Level C
A1PII-S3UT-01	A1PII-S3UT-01-04G	HPGe	480003.66	1351061.70	N/A
A1PII-S3UT-01	A1PII-S3UT-01-04M	TAL B	480003.66	1351061.70	Level C
A1PII-S3UT-01	A1PII-S3UT-01-04R	TAL A	480003.66	1351061.70	Level C
A1PII-S3UT-01	A1PII-S3UT-01-05G	HPGe	480002.66	1351093.80	N/A
A1PII-S3UT-01	A1PII-S3UT-01-05M	TAL B	480002.66	1351093.80	Level C
A1PII-S3UT-01	A1PII-S3UT-01-05R	TAL A	480002.66	1351093.80	Level C
A1PII-S3UT-01	A1PII-S3UT-01-06G	HPGe	480001.67	1351126.00	N/A
A1PII-S3UT-01	A1PII-S3UT-01-06M	TAL B	480001.67	1351126.00	Level C
A1PII-S3UT-01	A1PII-S3UT-01-06R	TAL A	480001.67	1351126.00	Level C
A1PII-S3UT-01	A1PII-S3UT-01-07G	HPGe	480000.67	1351158.10	N/A
A1PII-S3UT-01	A1PII-S3UT-01-07M	TAL B	480000.67	1351158.10	Level C
A1PII-S3UT-01	A1PII-S3UT-01-07R	TAL A	480000.67	1351158.10	Level C
A1PII-S3UT-01	A1PII-S3UT-01-08G	HPGe	479999.68	1351190.30	N/A
A1PII-S3UT-01	A1PII-S3UT-01-08M	TAL B	479999.68	1351190.30	Level C
A1PII-S3UT-01	A1PII-S3UT-01-08R	TAL A	479999.68	1351190.30	Level C
A1PII-S3UT-01	A1PII-S3UT-01-09G	HPGe	479998.69	1351222.40	N/A
A1PII-S3UT-01	A1PII-S3UT-01-09M	TAL B	479998.69	1351222.40	Level C
A1PII-S3UT-01	A1PII-S3UT-01-09R	TAL A	479998.69	1351222.40	Level C
A1PII-S3UT-01	A1PII-S3UT-01-10G	HPGe	479997.69	1351254.60	N/A
A1PII-S3UT-01	A1PII-S3UT-01-10M	TAL B	479997.69	1351254.60	Level C
A1PII-S3UT-01	A1PII-S3UT-01-10R	TAL A	479997.69	1351254.60	Level C
A1PII-S3UT-01	A1PII-S3UT-01-11G	HPGe	479996.70	1351286.70	N/A
A1PII-S3UT-01	A1PII-S3UT-01-11M	TAL B	479996.70	1351286.70	Level C
A1PII-S3UT-01	A1PII-S3UT-01-11R	TAL A	479996.70	1351286.70	Level C
A1PII-S3UT-01	A1PII-S3UT-01-12G	HPGe	479995.71	1351318.90	N/A
A1PII-S3UT-01	A1PII-S3UT-01-12M	TAL B	479995.71	1351318.90	Level C
A1PII-S3UT-01	A1PII-S3UT-01-12R	TAL A	479995.71	1351318.90	Level C
A1PII-S3UT-01	A1PII-S3UT-01-13G	HPGe	479994.71	1351351.00	N/A
A1PII-S3UT-01	A1PII-S3UT-01-13M	TAL B	479994.71	1351351.00	Level C

APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

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Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-01	A1PII-S3UT-01-13R	TAL A	479994.71	1351351.00	Level C
A1PII-S3UT-01	A1PII-S3UT-01-14G	HPGe	479993.72	1351383.20	N/A
A1PII-S3UT-01	A1PII-S3UT-01-14M	TAL B	479993.72	1351383.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-14R	TAL A	479993.72	1351383.20	Level C
A1PII-S3UT-01	A1PII-S3UT-01-15G	HPGe	479992.72	1351415.30	N/A
A1PII-S3UT-01	A1PII-S3UT-01-15M	TAL B	479992.72	1351415.30	Level C
A1PII-S3UT-01	A1PII-S3UT-01-15R	TAL A	479992.72	1351415.30	Level C
A1PII-S3UT-01	A1PII-S3UT-01-16G	HPGe	479991.73	1351447.50	N/A
A1PII-S3UT-01	A1PII-S3UT-01-16M	TAL B	479991.73	1351447.50	Level C
A1PII-S3UT-01	A1PII-S3UT-01-16R	TAL A	479991.73	1351447.50	Level C
A1PII-S3UT-02	A1PII-S3UT-02-01G	HPGe	479949.94	1350973.30	N/A
A1PII-S3UT-02	A1PII-S3UT-02-01M	TAL B	479949.94	1350973.30	Level C
A1PII-S3UT-02	A1PII-S3UT-02-01R	TAL A	479949.94	1350973.30	Level C
A1PII-S3UT-02	A1PII-S3UT-02-02G	HPGe	479949.12	1351005.60	N/A
A1PII-S3UT-02	A1PII-S3UT-02-02M	TAL B	479949.12	1351005.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-02R	TAL A	479949.12	1351005.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-03G	HPGe	479948.31	1351037.90	N/A
A1PII-S3UT-02	A1PII-S3UT-02-03M	TAL B	479948.31	1351037.90	Level C
A1PII-S3UT-02	A1PII-S3UT-02-03R	TAL A	479948.31	1351037.90	Level C
A1PII-S3UT-02	A1PII-S3UT-02-04G	HPGe	479947.49	1351070.20	N/A
A1PII-S3UT-02	A1PII-S3UT-02-04M	TAL B	479947.49	1351070.20	Level C
A1PII-S3UT-02	A1PII-S3UT-02-04R	TAL A	479947.49	1351070.20	Level C
A1PII-S3UT-02	A1PII-S3UT-02-05G	HPGe	479946.67	1351102.50	N/A
A1PII-S3UT-02	A1PII-S3UT-02-05M	TAL B	479946.67	1351102.50	Level C
A1PII-S3UT-02	A1PII-S3UT-02-05R	TAL A	479946.67	1351102.50	Level C
A1PII-S3UT-02	A1PII-S3UT-02-06G	HPGe	479945.85	1351134.80	N/A
A1PII-S3UT-02	A1PII-S3UT-02-06M	TAL B	479945.85	1351134.80	Level C
A1PII-S3UT-02	A1PII-S3UT-02-06R	TAL A	479945.85	1351134.80	Level C
A1PII-S3UT-02	A1PII-S3UT-02-07G	HPGe	479945.04	1351167.10	N/A
A1PII-S3UT-02	A1PII-S3UT-02-07M	TAL B	479945.04	1351167.10	Level C
A1PII-S3UT-02	A1PII-S3UT-02-07R	TAL A	479945.04	1351167.10	Level C
A1PII-S3UT-02	A1PII-S3UT-02-08G	HPGe	479944.22	1351199.40	N/A
A1PII-S3UT-02	A1PII-S3UT-02-08M	TAL B	479944.22	1351199.40	Level C
A1PII-S3UT-02	A1PII-S3UT-02-08R	TAL A	479944.22	1351199.40	Level C
A1PII-S3UT-02	A1PII-S3UT-02-09G	HPGe	479943.40	1351231.70	N/A
A1PII-S3UT-02	A1PII-S3UT-02-09M	TAL B	479943.40	1351231.70	Level C
A1PII-S3UT-02	A1PII-S3UT-02-09R	TAL A	479943.40	1351231.70	Level C
A1PII-S3UT-02	A1PII-S3UT-02-10G	HPGe	479942.58	1351264.00	N/A
A1PII-S3UT-02	A1PII-S3UT-02-10M	TAL B	479942.58	1351264.00	Level C
A1PII-S3UT-02	A1PII-S3UT-02-10R	TAL A	479942.58	1351264.00	Level C
A1PII-S3UT-02	A1PII-S3UT-02-11G	HPGe	479941.77	1351296.30	N/A

APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

~ = 2542

Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-02	A1PII-S3UT-02-11M	TAL B	479941.77	1351296.30	Level C
A1PII-S3UT-02	A1PII-S3UT-02-11R	TAL A	479941.77	1351296.30	Level C
A1PII-S3UT-02	A1PII-S3UT-02-12G	HPGe	479940.95	1351328.60	N/A
A1PII-S3UT-02	A1PII-S3UT-02-12GD	HPGe	479940.95	1351328.60	N/A
A1PII-S3UT-02	A1PII-S3UT-02-12M	TAL B	479940.95	1351328.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-12MD	TAL B	479940.95	1351328.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-12R	TAL A	479940.95	1351328.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-12RD	TAL A	479940.95	1351328.60	Level C
A1PII-S3UT-02	A1PII-S3UT-02-13G	HPGe	479940.13	1351360.90	N/A
A1PII-S3UT-02	A1PII-S3UT-02-13M	TAL B	479940.13	1351360.90	Level C
A1PII-S3UT-02	A1PII-S3UT-02-13R	TAL A	479940.13	1351360.90	Level C
A1PII-S3UT-02	A1PII-S3UT-02-14G	HPGe	479939.31	1351393.20	N/A
A1PII-S3UT-02	A1PII-S3UT-02-14M	TAL B	479939.31	1351393.20	Level C
A1PII-S3UT-02	A1PII-S3UT-02-14R	TAL A	479939.31	1351393.20	Level C
A1PII-S3UT-02	A1PII-S3UT-02-15G	HPGe	479938.50	1351425.50	N/A
A1PII-S3UT-02	A1PII-S3UT-02-15M	TAL B	479938.50	1351425.50	Level C
A1PII-S3UT-02	A1PII-S3UT-02-15R	TAL A	479938.50	1351425.50	Level C
A1PII-S3UT-02	A1PII-S3UT-02-16G	HPGe	479937.68	1351457.80	N/A
A1PII-S3UT-02	A1PII-S3UT-02-16M	TAL B	479937.68	1351457.80	Level C
A1PII-S3UT-02	A1PII-S3UT-02-16R	TAL A	479937.68	1351457.80	Level C
A1PII-S3UT-03	A1PII-S3UT-03-01G	HPGe	479937.30	1350888.20	N/A
A1PII-S3UT-03	A1PII-S3UT-03-01M	TAL B	479937.30	1350888.20	Level D
A1PII-S3UT-03	A1PII-S3UT-03-01R	TAL A	479937.30	1350888.20	Level D
A1PII-S3UT-03	A1PII-S3UT-03-02G	HPGe	479936.45	1350924.60	N/A
A1PII-S3UT-03	A1PII-S3UT-03-02M	TAL B	479936.45	1350924.60	Level D
A1PII-S3UT-03	A1PII-S3UT-03-02R	TAL A	479936.45	1350924.60	Level D
A1PII-S3UT-03	A1PII-S3UT-03-03G	HPGe	479935.60	1350961.10	N/A
A1PII-S3UT-03	A1PII-S3UT-03-03M	TAL B	479935.60	1350961.10	Level D
A1PII-S3UT-03	A1PII-S3UT-03-03R	TAL A	479935.60	1350961.10	Level D
A1PII-S3UT-03	A1PII-S3UT-03-04G	HPGe	479934.75	1350997.50	N/A
A1PII-S3UT-03	A1PII-S3UT-03-04M	TAL B	479934.75	1350997.50	Level D
A1PII-S3UT-03	A1PII-S3UT-03-04R	TAL A	479934.75	1350997.50	Level D
A1PII-S3UT-03	A1PII-S3UT-03-05G	HPGe	479933.90	1351033.90	N/A
A1PII-S3UT-03	A1PII-S3UT-03-05M	TAL B	479933.90	1351033.90	Level D
A1PII-S3UT-03	A1PII-S3UT-03-05R	TAL A	479933.90	1351033.90	Level D
A1PII-S3UT-03	A1PII-S3UT-03-06G	HPGe	479933.05	1351070.40	N/A
A1PII-S3UT-03	A1PII-S3UT-03-06M	TAL B	479933.05	1351070.40	Level D
A1PII-S3UT-03	A1PII-S3UT-03-06R	TAL A	479933.05	1351070.40	Level D
A1PII-S3UT-03	A1PII-S3UT-03-07G	HPGe	479932.21	1351106.80	N/A
A1PII-S3UT-03	A1PII-S3UT-03-07GD	HPGe	479932.21	1351106.80	N/A
A1PII-S3UT-03	A1PII-S3UT-03-07M	TAL B	479932.21	1351106.80	Level D

APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

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Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-03	A1PII-S3UT-03-07MD	TAL B	479932.21	1351106.80	Level D
A1PII-S3UT-03	A1PII-S3UT-03-07R	TAL A	479932.21	1351106.80	Level D
A1PII-S3UT-03	A1PII-S3UT-03-07RD	TAL A	479932.21	1351106.80	Level D
A1PII-S3UT-03	A1PII-S3UT-03-08G	HPGe	479931.36	1351143.20	N/A
A1PII-S3UT-03	A1PII-S3UT-03-08M	TAL B	479931.36	1351143.20	Level D
A1PII-S3UT-03	A1PII-S3UT-03-08R	TAL A	479931.36	1351143.20	Level D
A1PII-S3UT-03	A1PII-S3UT-03-09G	HPGe	479930.51	1351179.70	N/A
A1PII-S3UT-03	A1PII-S3UT-03-09M	TAL B	479930.51	1351179.70	Level D
A1PII-S3UT-03	A1PII-S3UT-03-09R	TAL A	479930.51	1351179.70	Level D
A1PII-S3UT-03	A1PII-S3UT-03-10G	HPGe	479929.66	1351216.10	N/A
A1PII-S3UT-03	A1PII-S3UT-03-10M	TAL B	479929.66	1351216.10	Level D
A1PII-S3UT-03	A1PII-S3UT-03-10R	TAL A	479929.66	1351216.10	Level D
A1PII-S3UT-03	A1PII-S3UT-03-11G	HPGe	479928.81	1351252.50	N/A
A1PII-S3UT-03	A1PII-S3UT-03-11M	TAL B	479928.81	1351252.50	Level D
A1PII-S3UT-03	A1PII-S3UT-03-11R	TAL A	479928.81	1351252.50	Level D
A1PII-S3UT-03	A1PII-S3UT-03-12G	HPGe	479927.97	1351289.00	N/A
A1PII-S3UT-03	A1PII-S3UT-03-12M	TAL B	479927.97	1351289.00	Level D
A1PII-S3UT-03	A1PII-S3UT-03-12R	TAL A	479927.97	1351289.00	Level D
A1PII-S3UT-03	A1PII-S3UT-03-13G	HPGe	479927.12	1351325.40	N/A
A1PII-S3UT-03	A1PII-S3UT-03-13M	TAL B	479927.12	1351325.40	Level D
A1PII-S3UT-03	A1PII-S3UT-03-13R	TAL A	479927.12	1351325.40	Level D
A1PII-S3UT-03	A1PII-S3UT-03-14G	HPGe	479926.27	1351361.80	N/A
A1PII-S3UT-03	A1PII-S3UT-03-14M	TAL B	479926.27	1351361.80	Level D
A1PII-S3UT-03	A1PII-S3UT-03-14R	TAL A	479926.27	1351361.80	Level D
A1PII-S3UT-03	A1PII-S3UT-03-15G	HPGe	479925.42	1351398.30	N/A
A1PII-S3UT-03	A1PII-S3UT-03-15M	TAL B	479925.42	1351398.30	Level D
A1PII-S3UT-03	A1PII-S3UT-03-15R	TAL A	479925.42	1351398.30	Level D
A1PII-S3UT-03	A1PII-S3UT-03-16G	HPGe	479924.57	1351434.70	N/A
A1PII-S3UT-03	A1PII-S3UT-03-16M	TAL B	479924.57	1351434.70	Level D
A1PII-S3UT-03	A1PII-S3UT-03-16R	TAL A	479924.57	1351434.70	Level D
A1PII-S3UT-04	A1PII-S3UT-04-01G	HPGe	479907.59	1350918.90	N/A
A1PII-S3UT-04	A1PII-S3UT-04-01M	TAL B	479907.59	1350918.90	Level C
A1PII-S3UT-04	A1PII-S3UT-04-01R	TAL A	479907.59	1350918.90	Level C
A1PII-S3UT-04	A1PII-S3UT-04-02G	HPGe	479906.01	1350973.30	N/A
A1PII-S3UT-04	A1PII-S3UT-04-02M	TAL B	479906.01	1350973.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-02R	TAL A	479906.01	1350973.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-03G	HPGe	479904.43	1351027.80	N/A
A1PII-S3UT-04	A1PII-S3UT-04-03M	TAL B	479904.43	1351027.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-03R	TAL A	479904.43	1351027.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-04G	HPGe	479902.85	1351082.20	N/A
A1PII-S3UT-04	A1PII-S3UT-04-04M	TAL B	479902.85	1351082.20	Level C

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APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

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Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-04	A1PII-S3UT-04-04R	TAL A	479902.85	1351082.20	Level C
A1PII-S3UT-04	A1PII-S3UT-04-05G	HPGe	479901.26	1351136.60	N/A
A1PII-S3UT-04	A1PII-S3UT-04-05M	TAL B	479901.26	1351136.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-05R	TAL A	479901.26	1351136.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-06G	HPGe	479883.72	1351184.60	N/A
A1PII-S3UT-04	A1PII-S3UT-04-06M	TAL B	479883.72	1351184.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-06R	TAL A	479883.72	1351184.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-07G	HPGe	479847.05	1351224.80	N/A
A1PII-S3UT-04	A1PII-S3UT-04-07M	TAL B	479847.05	1351224.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-07R	TAL A	479847.05	1351224.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-08G	HPGe	479810.37	1351265.10	N/A
A1PII-S3UT-04	A1PII-S3UT-04-08M	TAL B	479810.37	1351265.10	Level C
A1PII-S3UT-04	A1PII-S3UT-04-08R	TAL A	479810.37	1351265.10	Level C
A1PII-S3UT-04	A1PII-S3UT-04-09G	HPGe	479773.69	1351305.30	N/A
A1PII-S3UT-04	A1PII-S3UT-04-09M	TAL B	479773.69	1351305.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-09R	TAL A	479773.69	1351305.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-10G	HPGe	479737.01	1351345.60	N/A
A1PII-S3UT-04	A1PII-S3UT-04-10M	TAL B	479737.01	1351345.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-10R	TAL A	479737.01	1351345.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-11G	HPGe	479700.34	1351385.80	N/A
A1PII-S3UT-04	A1PII-S3UT-04-11M	TAL B	479700.34	1351385.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-11R	TAL A	479700.34	1351385.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-12G	HPGe	479663.66	1351426.10	N/A
A1PII-S3UT-04	A1PII-S3UT-04-12M	TAL B	479663.66	1351426.10	Level C
A1PII-S3UT-04	A1PII-S3UT-04-12R	TAL A	479663.66	1351426.10	Level C
A1PII-S3UT-04	A1PII-S3UT-04-13G	HPGe	479626.98	1351466.30	N/A
A1PII-S3UT-04	A1PII-S3UT-04-13M	TAL B	479626.98	1351466.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-13R	TAL A	479626.98	1351466.30	Level C
A1PII-S3UT-04	A1PII-S3UT-04-14G	HPGe	479590.30	1351506.60	N/A
A1PII-S3UT-04	A1PII-S3UT-04-14M	TAL B	479590.30	1351506.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-14R	TAL A	479590.30	1351506.60	Level C
A1PII-S3UT-04	A1PII-S3UT-04-15G	HPGe	479553.63	1351546.80	N/A
A1PII-S3UT-04	A1PII-S3UT-04-15M	TAL B	479553.63	1351546.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-15R	TAL A	479553.63	1351546.80	Level C
A1PII-S3UT-04	A1PII-S3UT-04-16G	HPGe	479516.95	1351587.00	N/A
A1PII-S3UT-04	A1PII-S3UT-04-16GD	HPGe	479516.95	1351587.00	N/A
A1PII-S3UT-04	A1PII-S3UT-04-16M	TAL B	479516.95	1351587.00	Level C
A1PII-S3UT-04	A1PII-S3UT-04-16MD	TAL B	479516.95	1351587.00	Level C
A1PII-S3UT-04	A1PII-S3UT-04-16R	TAL A	479516.95	1351587.00	Level C
A1PII-S3UT-04	A1PII-S3UT-04-16RD	TAL A	479516.95	1351587.00	Level C
A1PII-S3UT-05	A1PII-S3UT-05-01G	HPGe	479885.24	1351515.20	N/A

APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

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Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-05	A1PII-S3UT-05-01M	TAL B	479885.24	1351515.20	Level C
A1PII-S3UT-05	A1PII-S3UT-05-01R	TAL A	479885.24	1351515.20	Level C
A1PII-S3UT-05	A1PII-S3UT-05-02G	HPGe	479861.56	1351531.00	N/A
A1PII-S3UT-05	A1PII-S3UT-05-02M	TAL B	479861.56	1351531.00	Level C
A1PII-S3UT-05	A1PII-S3UT-05-02R	TAL A	479861.56	1351531.00	Level C
A1PII-S3UT-05	A1PII-S3UT-05-03G	HPGe	479837.88	1351546.70	N/A
A1PII-S3UT-05	A1PII-S3UT-05-03GD	HPGe	479837.88	1351546.70	N/A
A1PII-S3UT-05	A1PII-S3UT-05-03M	TAL B	479837.88	1351546.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-03MD	TAL B	479837.88	1351546.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-03R	TAL A	479837.88	1351546.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-03RD	TAL A	479837.88	1351546.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-04G	HPGe	479814.19	1351562.40	N/A
A1PII-S3UT-05	A1PII-S3UT-05-04M	TAL B	479814.19	1351562.40	Level C
A1PII-S3UT-05	A1PII-S3UT-05-04R	TAL A	479814.19	1351562.40	Level C
A1PII-S3UT-05	A1PII-S3UT-05-05G	HPGe	479790.51	1351578.20	N/A
A1PII-S3UT-05	A1PII-S3UT-05-05M	TAL B	479790.51	1351578.20	Level C
A1PII-S3UT-05	A1PII-S3UT-05-05R	TAL A	479790.51	1351578.20	Level C
A1PII-S3UT-05	A1PII-S3UT-05-06G	HPGe	479766.83	1351593.90	N/A
A1PII-S3UT-05	A1PII-S3UT-05-06M	TAL B	479766.83	1351593.90	Level C
A1PII-S3UT-05	A1PII-S3UT-05-06R	TAL A	479766.83	1351593.90	Level C
A1PII-S3UT-05	A1PII-S3UT-05-07G	HPGe	479743.15	1351609.70	N/A
A1PII-S3UT-05	A1PII-S3UT-05-07M	TAL B	479743.15	1351609.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-07R	TAL A	479743.15	1351609.70	Level C
A1PII-S3UT-05	A1PII-S3UT-05-08G	HPGe	479719.46	1351625.40	N/A
A1PII-S3UT-05	A1PII-S3UT-05-08M	TAL B	479719.46	1351625.40	Level C
A1PII-S3UT-05	A1PII-S3UT-05-08R	TAL A	479719.46	1351625.40	Level C
A1PII-S3UT-05	A1PII-S3UT-05-09G	HPGe	479695.78	1351641.10	N/A
A1PII-S3UT-05	A1PII-S3UT-05-09M	TAL B	479695.78	1351641.10	Level C
A1PII-S3UT-05	A1PII-S3UT-05-09R	TAL A	479695.78	1351641.10	Level C
A1PII-S3UT-05	A1PII-S3UT-05-10G	HPGe	479672.10	1351656.90	N/A
A1PII-S3UT-05	A1PII-S3UT-05-10M	TAL B	479672.10	1351656.90	Level C
A1PII-S3UT-05	A1PII-S3UT-05-10R	TAL A	479672.10	1351656.90	Level C
A1PII-S3UT-05	A1PII-S3UT-05-11G	HPGe	479648.42	1351672.60	N/A
A1PII-S3UT-05	A1PII-S3UT-05-11M	TAL B	479648.42	1351672.60	Level C
A1PII-S3UT-05	A1PII-S3UT-05-11R	TAL A	479648.42	1351672.60	Level C
A1PII-S3UT-05	A1PII-S3UT-05-12G	HPGe	479624.73	1351688.30	N/A
A1PII-S3UT-05	A1PII-S3UT-05-12M	TAL B	479624.73	1351688.30	Level C
A1PII-S3UT-05	A1PII-S3UT-05-12R	TAL A	479624.73	1351688.30	Level C
A1PII-S3UT-05	A1PII-S3UT-05-13G	HPGe	479601.05	1351704.10	N/A
A1PII-S3UT-05	A1PII-S3UT-05-13M	TAL B	479601.05	1351704.10	Level C
A1PII-S3UT-05	A1PII-S3UT-05-13R	TAL A	479601.05	1351704.10	Level C

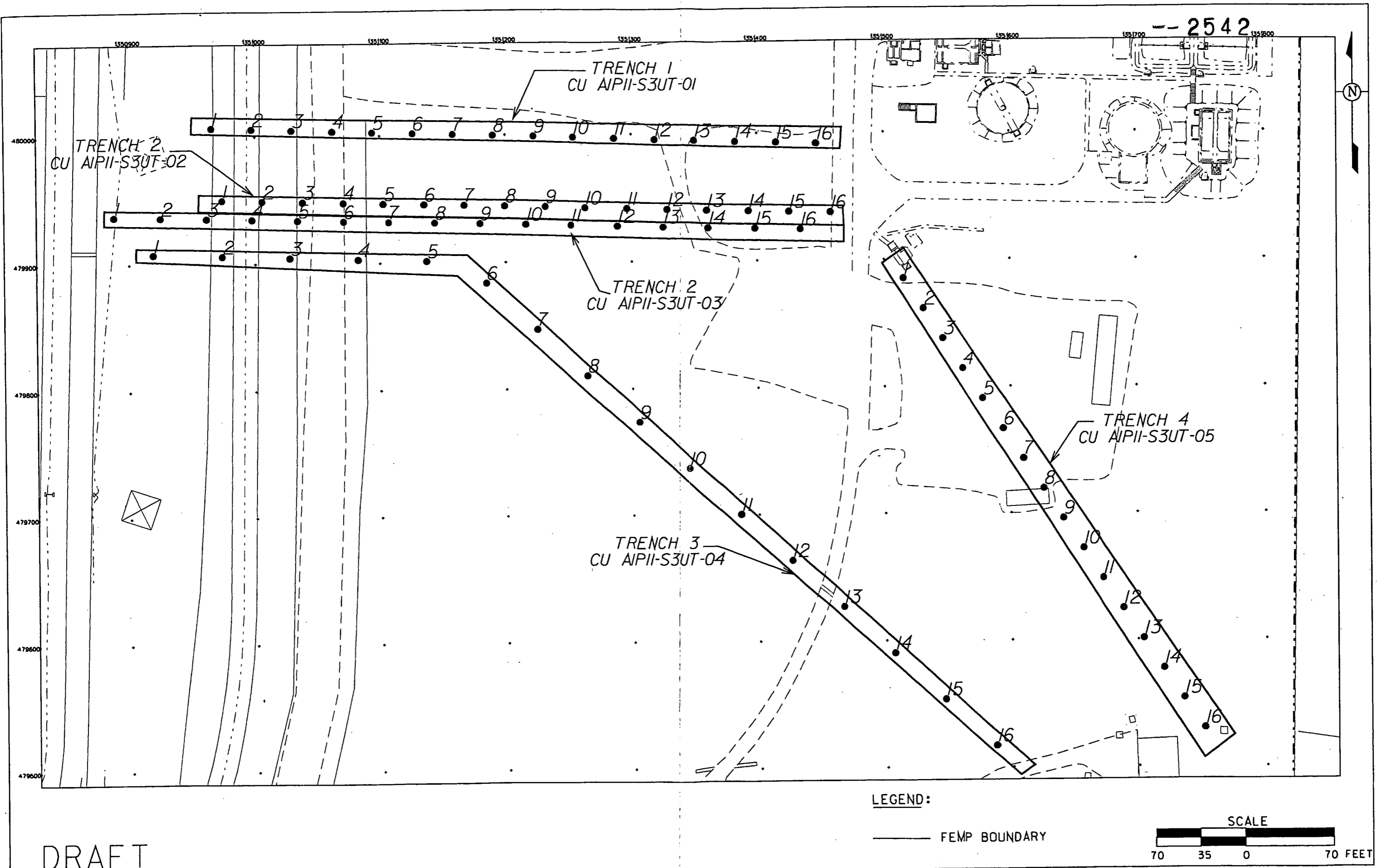
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APPENDIX B
A1PII UTILITY TRENCH CERTIFICATION

Sample Identifiers, TALs, Locations, and Validation Information

-- 2542

Certification Unit	Sample ID	TAL List	Northing	Easting	Validation?
A1PII-S3UT-05	A1PII-S3UT-05-14G	HPGe	479577.37	1351719.80	N/A
A1PII-S3UT-05	A1PII-S3UT-05-14M	TAL B	479577.37	1351719.80	Level C
A1PII-S3UT-05	A1PII-S3UT-05-14R	TAL A	479577.37	1351719.80	Level C
A1PII-S3UT-05	A1PII-S3UT-05-15G	HPGe	479553.69	1351735.60	N/A
A1PII-S3UT-05	A1PII-S3UT-05-15M	TAL B	479553.69	1351735.60	Level C
A1PII-S3UT-05	A1PII-S3UT-05-15R	TAL A	479553.69	1351735.60	Level C
A1PII-S3UT-05	A1PII-S3UT-05-16G	HPGe	479530.00	1351751.30	N/A
A1PII-S3UT-05	A1PII-S3UT-05-16M	TAL B	479530.00	1351751.30	Level C
A1PII-S3UT-05	A1PII-S3UT-05-16R	TAL A	479530.00	1351751.30	Level C



PSP/Project #: _____

Batch Numbers: _____

HPGe file Numbers: _____

**REAL-TIME ELECTRONIC
DATA QUALITY CONTROL CHECKLIST**

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#	ITEM TO BE CHECKED	✓ or No	Modification/Correction with explanation	Date Corrected
1	Receive the Characterization Request form, Monitoring Form (MF), coverage maps, real-time verification checklist, and/or HPGe parameter summary report from the Characterization field personnel			
2	Verify the signatures and all blanks on the MF are complete through Section 6 and complete on the Real-Time Verification Checklist			
3	Check loader to ensure the data transferred from the LAN to the SED (if the data files are in the SED, the loader is working properly)			
4	Check to ensure data transferred into the correct fields by looking at the data on the LAN in comparison with the data transferred to the SED (to verify this, all data fields for a few runs in each file will be reviewed)			
5	Check that the project number is correct and is consistent on the MF, the LAN, and the SED in both the worksheet files and the results/data files			
6	Check that the MF, the LAN, and the SED have the correct location identifier in both the worksheet files and the results/data files			
7	Check that worksheet on the LAN and in the SED have the correct elevation documented from the surveying group			
8	Verify northing and easting coordinates, look at the plotted map and the coordinates in the SED and verify the coordinates are within the boundary on the plotted map			
9	Check data files to ensure all files are received			
10	Attach this checklist and documentation for modifications to the EMF, initial and date all forms and documentation		X	X
11	Insert USE into the "QC Field" on the SED after all this has been checked and verified correct		X	X

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Sign and Date _____

PSP/Project #: _____

Batch Numbers: _____

HPGe file Numbers: _____

1. If no, check with the Characterization Lead or designee to get needed forms. 2542
2. If no, contact Characterization Lead and return MF to be completed and/or signed.
3. If no, check with SED Database Manager (ext. 7544) to find out why.
4. If no, check with the Real-Time Field Lead to see if any additional fields were added. If so, call SED Database Manager (ext. 7544) to have the field added into the SED tables. If not, check with SED Database Manager (ext. 7544) to see why the fields loaded incorrectly.
5. If no, verify the correct project number with the Characterization Lead and insert the project number into the worksheet on the LAN and the worksheet in the SED; attach the documentation to the form.
6. If no, verify with the Characterization Lead the correct identifier and correct the identifier both in the worksheet on the LAN and in the SED; attach the documentation to the form.
7. If no, check with the Surveying group to verify the elevation; If incorrect, change the elevation in the worksheet on the LAN and in the SED and attach the documentation to the form.
8. If no, check with Characterization Lead or designee to resolve the problem.
9. Run query in SED. The number of RTRAK/RSS files can be checked with the number of records (files) listed in the SRDIG directory under Real-Time Lab View files. No sequential gaps are anticipated; if gaps are found, check with the Real-Time Field Lead. The Real-Time Field Lead will verify gaps or will investigate to find out why the files are missing. For HPGe shots, an HPGe Data Verification Checklist is attached to the MF listing all the files. This Checklist can be used to ensure all the files were received in the SED.